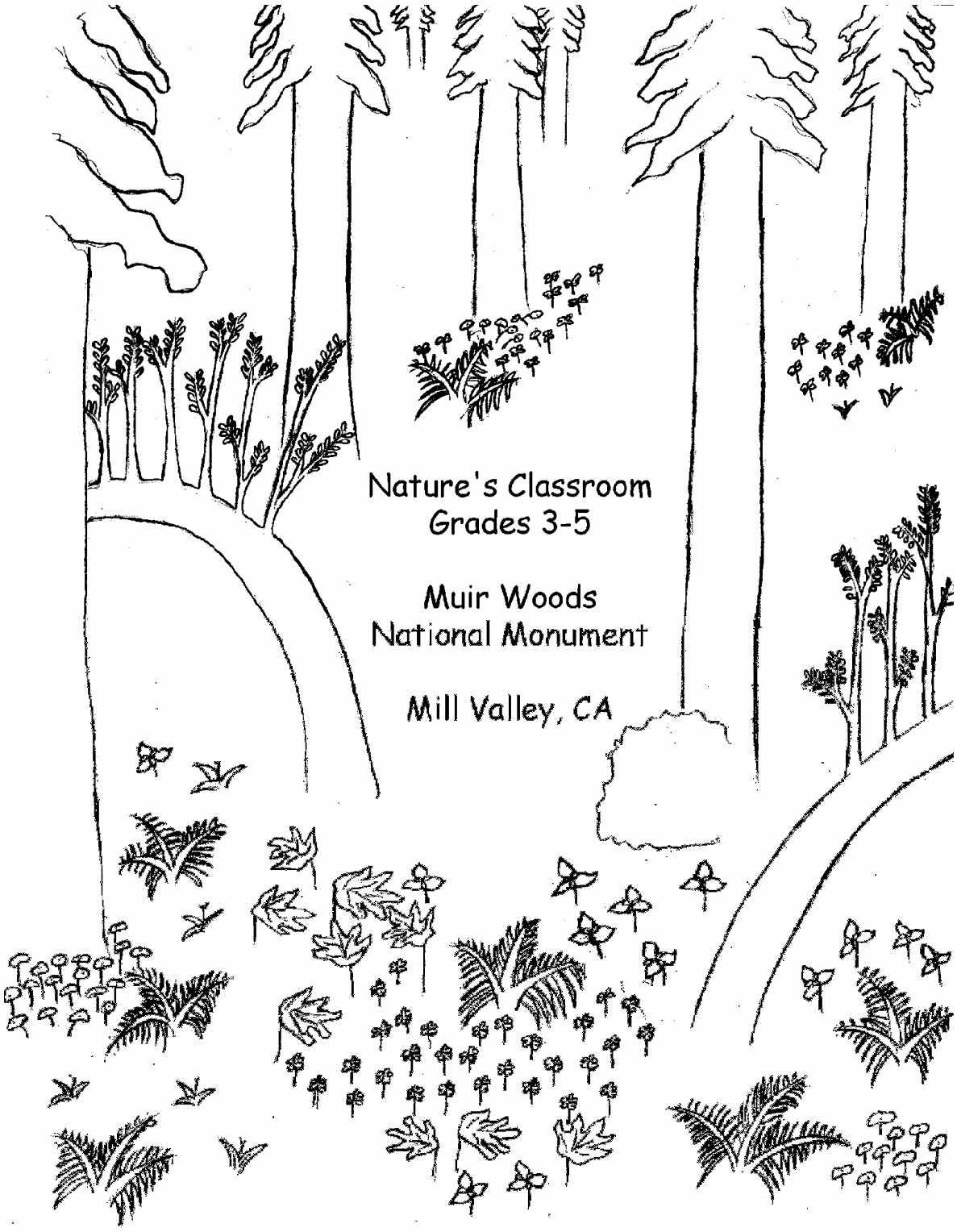

Nature's Classroom
Grades 3-5
Muir Woods
National Monument
Mill Valley, CA

Dear Educator:

Welcome to the Parks as Classrooms program at Muir Woods National Monument. The Parks as Classrooms program strives to introduce the National Parks to teachers for use as a tool and educational resource. These programs, created in partnership with educators and community members, engage teachers and students in the mission of the National Park Service. They also serve to meet the educational needs of our communities and park supporters.

We are pleased that your class is participating in Nature's Classroom, an educational program for third through fifth grade. This program uses the natural resources of Muir Woods to lead students on an exploration of redwood tree growth and the survival of all life within the park using their "tools" – their five senses.

We hope that you will enjoy participating in the program, and that your visit to Muir Woods is educational and exciting! If you have any questions about the program or need help planning your visit, feel free to contact us at (415) 388-0107.

See you in the woods!

The Muir Woods Education Staff

Directions to Muir Woods National Monument

From the North:

Take 101 South to the Stinson Beach/Highway 1 exit. Turn right immediately and then left at the light. Turn left at the gas station, then follow the signs to Muir Woods. Meet at the Visitor Center.

From the South:

Take 101 North over the Golden Gate Bridge (there is no toll travelling north-bound). Take the Mill Valley/Stinson Beach/Highway 1 exit. Go through the traffic lights, then turn left at the gas station. From there follow the signs to Muir Woods. Meet at the Visitor Center.

From the East:

Take 580 West over the Richmond Bridge. Then take 101 South to the Stinson Beach/Highway 1 exit. Turn right immediately and then left at the light. Turn left at the gas station, then follow the signs to Muir Woods. Meet at the Visitor Center.

Upon leaving the park, turn right out of the parking lot and continue until Highway 1. To connect back with Highway 101, or to go to Muir Beach, turn left onto Highway 1. To continue going north to the Muir Beach Overlook, or Stinson Beach turn right onto Highway 1.

Program Overview:

Nature's Classroom is a self-guided tour of Muir Woods created in accordance with state science standards. During the tour, students will discover ecological concepts and issues of sustainability through questioning, hands-on exploration, and facilitated discussion.

Each activity is designed to build on the last to show students' developing understanding of concepts. Concepts addressed in the program include:

-Redwood growth
-Species interdependence
-Survival of redwoods and other living things
-Habitat protection

There are four parts to the program:

-Pre-visit introductory lessons
-Self-guided park program
-Post-visit activities
-Program Assessment

Pre-Visit Introductory Lessons

These lessons should be conducted at least one day prior to the visit. They are designed to initiate student thinking about the parts of a forest, their views on forests, and using their five senses. In the classroom, the teacher acts as a facilitator while the students begin to formulate their own ideas about forest life.

Self-Guided Park Program

At the park, you will be met at the Visitor Center by a Park representative who will engage the class in a discussion of redwood forest ecology. After the ranger talk, you will split your class into smaller groups with adult leaders. In these groups, students continue their inquiry into redwood ecology and survival in a redwood forest. Students examine practices that can help a forest and discover ways the park service and park visitors can help keep the park healthy.

Teachers and parent/adult chaperones act as guides and facilitators through the students' process of discovery. Guides allow the students to examine and question all assumptions, correct or incorrect, and let them draw their own conclusions. The participation of chaperons is integral to the success of Nature's Classroom. Their enthusiasm and exemplary behavior will greatly add to each group's learning experience.
Please make sure to return the fee waiver and video when you come for your visit.

Post-visit Activities

Included in this packet is a list of suggested post-visit activities. These activities are designed to allow the students to further examine their criteria for a healthy redwood forest ecosystem. They use the ideas the students started with and their experiences during the on-site visit to demonstrate through creative art and scientific exploration what they learned and how they learned it.

Program Assessment

The primary objectives of this program are to allow the students to use their natural curiosity about the world to explore scientific concepts and to lead them to the ideas of care and stewardship for our environment.

The teacher is required to complete an evaluation form at the end of the program. An evaluation of the program is necessary to measure the program's effectiveness and its ability to meet the needs of the students. Your professional opinion and experience are valuable to the program's future.

Program Goals:

Students will:

1. Develop their sense of inquiry.

2. Understand the different communities in a forest.

3. Develop observational skills.

4. Understand the concept of species interdependence.

5. Develop a sense of respect for all living organisms and their habitats.

6. Develop a sense of responsibility to preserve our National Parks and other natural areas.

Program Objectives:

Upon completion of the program, students will:

1. Know the basic characteristics of the core, edge and riparian communities (i.e. weather and vegetation).

2. Name one plant or animal that thrives in each community.

3. Have produced entries within their journals regarding natural observations.

4. Be able to tell who John Muir was and why the park was named after him.

5. Have produced at least one creative product exposing their knowledge of the forest communities.

Planning Your Visit:

On the day of your visit, please make sure that each person in your group has the following items:

-Lunch
-Layered clothing including pants and sweatshirt or jacket
-Sturdy walking shoes
-Nametag
-Rain jacket (optional)

Please arrive at Muir Woods at least 10 minutes before your scheduled time to organize your group. Restrooms and water fountains are located in the main parking lot.

Please inform the visitor center of your arrival. A park representative will then greet your group at the visitor center. Students should wear their nametags to the park.

Rules:

During your visit, you and your adult chaperones are responsible for the conduct of your students. Please make sure that everyone understands the rules before your visit.

-Walk at all times. Running can be dangerous.
-Stay together as a group. Don't leave the trail.
-Do not eat in the park – animals can become dependent on our food.
-Please remain quiet at all times.
-Keep the park clean. Do not leave food or trash on the ground.
-Respect the plants and animals in the park. Do not pick plants, hurt animals, disturb their homes, or throw rocks.
-Do not remove anything from the park.

Weather:

Muir Woods is generally cool and damp throughout the year. The winter months are usually rainy and the summer months tend to be foggy. Muir Woods is also very shady, so the temperature inside the park is generally 10 degrees cooler than the parking area. Always wear warm, layered clothing and sturdy shoes.

Parking:

There is parking for buses in the main parking lot, and there are two lots available for car parking. **Buses going to Muir Woods can be no longer than 35 feet.**

Cancellations:

We request that you cancel or reschedule your program at least 24 hours prior to your reservation date. If unusual circumstances arise on the day of your program, please call us promptly at 8:30 a.m. to cancel.

Lunch:

Picnicking is not permitted at Muir Woods. This rule is in effect in order to keep trash and leftovers from becoming an attraction for local wildlife. We want to ensure that the animals that live in the woods remain dependent on natural sources for their food.

Lunch may be eaten nearby at:

Muir Beach – turn right out of the parking lot. Go straight at the Highway 1 intersection then turn right at the next intersection. The road ends in the Muir Beach parking lot. (6 minutes; 3 miles).

Muir Beach Overlook – turn right out of the parking lot. Go right at the Highway 1 intersection, and continue uphill. Turn left on Muir Beach Overlook Drive. (8 minutes; 3.6 miles)

Stinson Beach – turn right out of the parking lot and turn right at the Highway 1 intersection. Take Highway 1 north to Stinson Beach. (20 minutes; 9.3 miles)

Pre-visit Activities

The following are suggested examples of pre-visit activities. Feel free to use those that will work best for your class and your curriculum. You may choose to adapt the activities as you see fit.

1. Perspectives

Summary:

Teacher facilitates this classroom lesson. Students read a short biography of John Muir and discuss aspects of his life. They then create personalized nature journals to record their thoughts and ideas throughout the program. Students also learn about the National Park Service mission. They then complete a vocabulary crossword puzzle and discuss their questions and answers.

Materials Needed:

- John Muir biography
- Recyclable paper
- Cardboard
- Two-Hole punch
- Rubber Bands
- Stick or Pencil
- Vocabulary list
- Crossword puzzle and answer sheet

Part 1

Have the students read the biography of John Muir. Have a discussion on what they read and about the importance of keeping a journal. John Muir, deeply moved by the beauty of nature, wrote personal feelings, encounters, and observations in his journal. Likewise , the students will be personally moved by things they learn in the class and at Muir Woods. This journal will serve as each student's account of his or her personal activities, reflections, feelings and observations.

Have each student create their own personalized journal. You may want to use the blank side of recyclable paper and cardboard for the back. The students may want to design their own cover. Punch two holes in the top and thread a rubber band through the holes. Use a stick or pencil to hold it in place.

John Muir Biography

Muir Woods National Monument has lots of visitors each year who come to discover the beauty of an ancient redwood forest. Many of those visitors ask the rangers, "What is a Muir?" Well, a Muir is not a thing, but a very important person who dedicated his life to writing and informing people of the wonders of nature.

John Muir, who the park is named for, was born in Dunbar Scotland in 1838. When he was 11 years old his family immigrated to the United States and settled in Wisconsin on land that they turned into a farm. They all worked very hard on the farm, sometimes working 16 hours in one day. John had a curiosity of the plants and animals that lived near his home. He also loved to read. He would awake in the very early morning while his family slept so he would have the time. His favorite books were on mathematics.

John also was an inventor. He thought there was a better and easier way to do things. He invented a thermometer, clocks, and a bed called a "early-raising machine". It was a bed that worked like an alarm clock. When it was time to get up, the bed would rise and tip you onto the floor. Everyone was impressed with his inventions and encouraged him to go to the Wisconsin state fair in Madison to display them. So, at the age of 22, John left home and went to Madison. He was the hit of the fair. Newspaper articles were written about John and his amazing inventions.

John had a desire to continue his education and wanted to attend the University of Wisconsin, so he started to take jobs to save money for his education. He was accepted into the University and found that botany, the study of plants, was his favorite subject. At the university he made a good friend, Jeanne Carr, she had studied botany for many years. He stayed at the university for four years but his yearning to be in nature and finding and learning about plants started his journeys.

First John went to Canada and wandered and drew and wrote about the plants he saw in his journal. He moved to Indiana and needed to work to earn some money, so he got a job in a factory. One day while working on a machine a part flew off it and hit him in his eye. This made him go temporarily blind. The doctor told him he needed to stay out of the light for four months and his sight may come back. John was very fearful that he would never see the beauty of nature again and made a pact with himself, if his eyesight did come back, he would go on a trip and see and write about all the plants, his thoughts and adventures.

John's eyesight did return and he said good-bye to all his friends and family and left on a 1,000 mile walking trip from Indiana to Florida. All along the way he recorded in his journal everything he saw and did. His journey did not end there. He then took a boat to Cuba and then a ship to San Francisco. He had read about the beauty of Yosemite Valley and desperately wanted to visit it. He arrived in San Francisco in 1868 and immediately started off for Yosemite.

John spent many years hiking around Yosemite and recording his thoughts and findings in his journal. He would send all his writings to his friend Jeanne Carr who was now living in Oakland. She encouraged him to write about his journeys and what he has seen using his journals. So, John started writing very popular articles that were in many magazines. People from all over the country were reading and learning from his articles. President Theodore Roosevelt visited Yosemite and requested that John take him on a camping trip. Because of his writings and love of Yosemite it is today a National Park.

John married and lived in Martinez, California with his wife and two daughters. They owned an orchard. It is now a National Historic Site that you can visit. He still traveled to new places continuing to keep his journal and writing about his travels.

When Muir Woods National Monument was named after him in 1908, John Muir was very honored. He said, "This is the best tree lovers monument that could possibly be found in all the forests of the world. You have done me great honor, and I an proud of it."

Because of people like John Muir, who took the time and effort to show others the value of the natural environment, we today have the National Park Service. The National Park Service mission is to Preserve our natural and cultural heritage for generations to come, to Protect buildings, monuments and lands as to leave them unimpaired for the future, and to Provide opportunities for learning and enjoyment. A visit to Muir Woods National Monument can provide everyone with the opportunity to feel the same sense of wonder and amazement that John Muir felt many years ago.

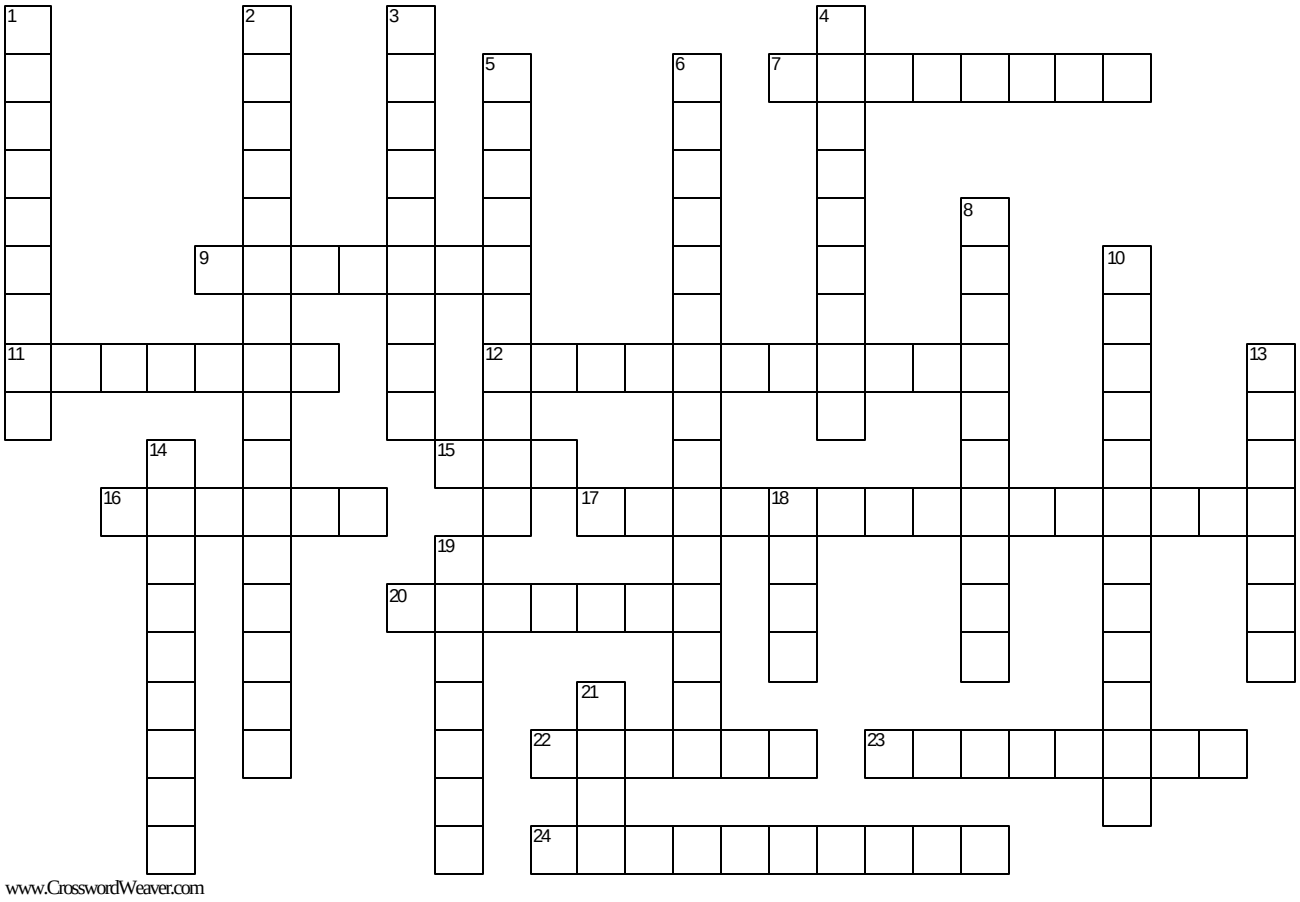
Part 2

Teacher distributes the vocabulary list and crossword puzzle. Definitions to the hidden words are provided in the vocabulary list. To solve the puzzle, students must consult the vocabulary list and look for the words that match the definitions.

Students then review their original definitions and proposed answers. They consult the vocabulary list to see if they can find possible answers.

Students then review and modify their definitions and answers in their notebooks.

Each group of students selects their most interesting definition. The class compiles a list of these on the board.



Clues can be found on the following page

Across

7 A person who studies the science of plants.
9 A place where a plant or animal has all the things it needs to survive.
11 To search in hope of discovery.
12 The degree of heat shown on a standard scale.
15 Particles of water suspended in the air at or near the ground.
16 The top layer of leaves and branches on the forest's tallest trees. The ceiling of the forest.
17 A person that helps protect land and natural resources.
20 To make available.
22 A dense growth of trees and understory covering a large area.
23 To keep in perfect or unaltered condition.
24 A member of the ecosystem that recycles dead plants and animals by feeding on them.

Down

1 All the living and nonliving things in an area.
2 Plants, animals, water, soil and other materials found in nature.
3 The height of something from a point of reference.
4 A natural group living together, either plant, animal, human etc.
5 Plant life.
6 Relationships among living things where all depend upon one another.
8 The smaller trees and plants growing under the tallest trees.
10 Protected areas across the country for people to use and enjoy.
13 To keep from being damaged or injured.
14 Small pieces or parts.
18 The community on the outer most part of the forest. It is dry and warm and is at a higher
elevation.
19 To destroy by wearing away.
21 The community that is the central part of the forest. There is a low amount of light and a high population of tall trees.


1 ECOSYSTEM
2 NATURALLY
3 ELEVATION
4 COMMUNITY
5 VEGETATION
6 INTERDEPENDENCE
7 BOTANIST
8 UNDERSTORY
9 HABITAT
10 NATIONALPARK
11 EXPLORE
12 TEMPERATURE
13 PROTECT
14 PARTICLES
15 FOG
16 CANOPY
17 CONSERVATION
18 EDGE
19 EROSION
20 PROVIDE
21 CFOR
22 FOREST
23 PRESERVE
24 DECOMPOSER

Vocabulary List

Botanist: A person who studies the science of plants.

Canopy: The top layer of leaves and branches on the forest's tallest trees. The ceiling of the forest.

Community: A natural group living together, either plant, animal, human etc.

Conservationist: A person that helps protect land and natural resources.

Core: The community that is the central most part of the forest. There is a low amount of light and a high population of tall trees.

Decomposer: A member of the ecosystem that recycles dead plants and animals by feeding on them.

Ecosystem: All the living and nonliving parts in an area.

Edge: The community on the outer most part of the forest. It is dry and warm and is at a higher elevation.

Erosion: To destroy by wearing away.

Explore: To search for the purpose of discovery.

Fog: Particles of water suspended in the air at or near the ground.

Forest: A dense growth of trees and understory covering a large area.

Habitat: A place were living things live and are most likely to be found.

Interdependence: Relationships among living things where all depend upon one another.

National Park: Protected areas across the country for people to use and enjoy.

Natural Resources: Plants, animals, water, soil and other materials found in nature.

Preserve: To keep in perfect or unaltered condition.

Protect: To keep from being damaged or injured.

2. What a Forest Means to Us

Summary:

Teacher facilitates this classroom lesson. Students produce a visual picture of what they believe they will find in the woods. Students then discuss their findings. Students also watch a video (*Into the Forest*) and/or view the photo tour about Muir Woods and discuss what they have seen.

Materials Needed:

- Art supplies
- Magazines
- Glue
- Large sheets of paper
- *Into the Forest* Video and/or Photo Tour
- TV, VCR

Part 1

Students form four groups. Explain that each group will discuss what they expect to see, feel, smell, hear and taste in the forest. They will use their redwood journals to write down what they imagine. Each group then produces a collaborative picture of what they have come up with. This activity is the beginning of their exploration of the forest. The five senses play an important role in the investigation of the communities of the redwood forest at Muir Woods.

Option: The groups can look through old magazines and newspapers to collect images that would represent their forest. Once they've collected a significant amount of images, paste them on a piece of paper to make a collage.

Part 2

Teacher presents the video and/or photo tour to the class. Please stop the video or photo tour at appropriate times to have short class discussions and/or have the students keep a record of their thoughts in their journals.

Part 3

Students read about the three communities of the forest (core, edge, and riparian). A classroom discussion is facilitated about the characteristics of each community. Have the students record their findings in their journals.

Core Community

The core community is in the middle of the forest. It has the tallest trees, which creates a canopy or a ceiling for the forest. Sun may shine through in spots, but it is usually very shady and cool. The smaller plants and trees have adapted and can survive with very little light, or they grow towards the light, bending and twisting.

Edge Community

The edge community is the outermost part of the forest. It is dry, warm, and high in elevation. This community's temperature is usually the warmest because the canopy, or ceiling the trees create, is thin and lets lots of sun into it. The plants in the understory, the plants that grow beneath the trees, get lots of sun.

Riparian Community

The riparian community occupies land next to water. The ground is damp and plants that require large amounts of water live here. It is low in elevation. The temperature can be cool or warm depending on the weather. The canopy here lets some sunlight shine into the community.

Self-Guided Park Program

Stop 1 – Visitor Center

1. Make sure your students use the bathrooms located in the parking lot.
2. Check into the Visitor Center – hand in your fee waiver and return your video. You will be given four nature detective maps (which contain the information for the self-guided program recorded in this section) for your use exploring the woods. You can also print up the maps and guides on the CD.
3. You will be met at the Visitor Center by the park staff member who will give you an orientation. Make sure to alert the staff member of your methods of classroom control and ask them any questions you have about the program or Muir Woods. Also, let them know how long of a talk you want, and if you have any questions about travelling to the location in which you will eat lunch.
4. The staff member will give a quick introduction at the Visitor Center, and then will lead your class on a ten minute walk to the Classroom area inside the woods.

Stop 2 – Classroom Area

1. The park staff will give your class a ten to fifteen minute talk on redwood forest ecology. The staff member will lead the students in a discussion of:

- How tall the redwood trees are
- How redwood trees start off their lives
- What redwood trees need to grow (water, sun, air, space, nutrients)
- How redwood trees can die and how their death can help the forest
- The animals that live in Muir Woods
- ***What forest community they are inside of (the core)***
- The rules for their visit:
    - Talk in quiet voices and do not run
    - Do not eat in the woods
    - Stay on the trail
    - Leave everything as you found it (do not take anything with you)

2. You and the students can ask the staff member any last questions.
3. You are free to do the rest of your program on your own. You may want to divide your class in several groups, each with a different teacher or adult/parent chaperone.

Stop 3 – Before Bridge 2

1. After leaving the Classroom Area, turn left and proceed north along the path. Stop at Bridge 2.
2. Take a moment to look at the pavement under your feet.
3. Is it flat (No). Why not? (Redwood roots are growing underneath). Explain to students that roots assist the tree with strength to stand and also with water intake. Redwood roots only grow approximately 10 feet below the ground, but extend for 50-100 feet around the tree.

Stop 4- Bridge 3

1. Walk about halfway across Bridge 2 and stop to look in the creek. ***What forest community are the creek and creek side areas a part of? (the riparian)***
2. Does anyone see any fish? (In the winter months you may see full-grown salmon or trout; the rest of the year look for baby fish swimming in the pools). Explain to students the 3-year cycle of the Coho Salmon. Ask them if they know where the water comes from and where it eventually flows to.
3. Why does the sign say "please do not throw coins in the creek?" (coins are not good for the fish).
4. How is the creek important to the redwood trees? (Helps water them).

Stop 5 – Bohemian Grove

1. Finish walking across the bridge and turn left. Walk along the path and you will come to a hollowed-out tree on your left.
2. What do you think happened to this tree? (A fire burned it). Is it still alive? (Yes). How can you tell? (Look up – the needles are still green). Ask students if and why fire is important to the health of a forest.
3. This is a good area to stop and have students add to their journals.

Stop 6 – Open Area

1. Continue walking south (downstream) along the path. Along the way, look up once in a while to see the different amounts of light that reach the forest floor. Stop along the path at a wide spot. ***What forest community is this area? (the edge)***
2. Do you see the same plants growing in open areas and under redwood trees? (No). Why not? (Some plants need more light than others). Explain how Bay Laurel trees reach and bend for sunlight, and how fallen trees open up gaps for sunlight to stream through.

Stop 7 – Fallen Tree

1. Continue to follow the path. Stop when you come to the fallen tree (the tree lying across the path with the middle cut out).
2. How do you know how old a tree is? (By counting the rings).
3. Look closely at the rings. See how some of the rings are bigger than others? Why would this be? (The big rings occur in years when the tree grows a lot – when it gets plenty of sun and water). Ask students what plants, animals and insects might make homes out of fallen trees.

Stop 8 – Boardwalk After Bridge 1

1. Follow the path as it crosses bridge 1 and turn right to exit the park. If time allows, a short walk to your left will take you to the crosscut and trees of the world exhibit.
2. Think about the boardwalk under your feet. How is this different from the asphalt you saw before with the redwood roots under it? Which do you think is healthier for the trees? The animals?

Stop 9 – Visitor Center

1. You have now finished your journey through Muir Woods. Please return the nature detectives guide and map to the Visitor Center so that future classes can use it.

Post-Visit Activities

These activities are geared towards cementing the concepts the students learned on their journey. Again, choose those most appropriate for your class and change the activities as necessary.

1. Build a Tree Activity

Summary:

Following their visit to Muir Woods, students will need reinforcement of the concepts they learned. In this lesson, students re-create the life of a tree by collaborating in "building" a Redwood and acting out the processes that keep it alive.

Materials needed: None. Enough space should be provided for students to form a large circle.

1. **Heartwood** – This is the innermost layer of the tree. These children will stand straight and strong, and can make heartbeat noises if they like. This will be the smallest group with just one or two children for a group of 25.
2. **Xylem** – This is the next layer of the tree that brings the water up from the roots to the leaves. Students will crouch down and "grasp" the water with their hands, bringing it up to the leaves. This should be just a few children.
3. **Phloem** – This is the next layer that brings the sugars down from the leaves through the tree. These children start out standing with their arms like branches and slowly crouch down, bringing nutrients through the tree. This will be the second to largest group.
4. **Bark** – This layer protects the tree from insects who want to eat the sweet phloem, and also protects it from fire. These children should hold hands to protect the insides of the tree, and can softly "bark" like a dog. This will be most of the children because they need to fit around the rest of the group.

Once the tree is built, have it "work" with the heartwood standing straight and strong, the xylem delivering water, the phloem delivering nutrients, and the bark protecting the tree.

2. Showing What We Have Learned

Summary:

Teacher facilitates this classroom lesson. Students review what they have learned about Muir Woods and forest community ecology. Each student will create a brochure or field guide about a plant or animal that lives in one of the communities. Students can present their brochure to the class during a teacher facilitated discussion. Students are encouraged to send the brochures (or copies) to Muir Woods.

Materials:

- 1 sheet paper (for each student)
- Markers, crayons, pencils, paint, etc.

Each student should receive a sheet of paper folded in three equal sections. Using art supply materials, students should draw and label the element they have chosen on the front side (first section). On the second section students can describe that element in paragraph, story or poem form. On the final section the students can describe how the element uses or contributes to each community found at Muir Woods.

Students should be encouraged to think of connections between the element's role in Muir Woods and a similar role in their community. For example, a Banana Slug might be shown driving a garbage or recycling truck.

Students can discuss afterwards as a class the special qualities of the element they chose. Questions to ask here might include:

What (if any) uses that element for food / shelter / habitat?
What would happen if a non-native plant or animal entered the scene?
What effects would global warming, drought, floods, fire or litter have on their element?

Students should present ways in which all their elements are interconnected.

(Lesson can be adapted and presented as a "post-card" or "comic strip" activity as well)

3. Revisiting Our Nature Journals

Summary:

Teacher facilitates this classroom lesson. Students use their journal entries from the program to produce a review of what they have learned and accomplished. Students will produce an account, a story, a poem or a letter that describes their own personal experience in nature. Students are encouraged to send these summaries (or copies) to Muir Woods.

Materials Needed:

- Student journals
- Pencils

Students take time to revisit the entries in their nature journals. They should look for connections and themes that may now be apparent after having time to digest what they have learned.

Students sort out their findings into a clear idea and sum up what they have learned. Students are given some options on how to present this:

- A story about the forest communities from the perspective of a plant/animal
- A factual account of the ecological connections at the woods
- A set of poems, Haikus or detailed drawings reflecting their feelings about the woods
- A letter to a friend describing their experience

Students should be reminded of John Muir and his journaling experience. Teachers should inform students that taking notes, making sketches and noting their feelings while in nature is only a part of the experience. Revisiting these notes after time will allow for connections and larger themes to become apparent. Students should also be reminded that a nature journal is never finished, as there is always something that can be added.

Teacher Evaluation

NAME: SCHOOL:

VISIT DATE: GRADE:

1. Was the pre-visit material sent to you helpful? Which teaching tools did you use? (i.e., park nature guide brochure, video, Photo Tour, Redwood Vocabulary list, etc.).

2. Did your students complete any of the pre- or post-site activities? (Circle the activities completed). What was your impression of these activities?

a) Perspectives
b) What a forest means to us
c) Build a tree
d) Showing what we have learned
e) Revisiting our nature journals

3. What was the ranger's name that worked with your class?

4. Describe the ranger's effectiveness at communicating with your students.

5. Was the program appropriate to your grade level? YES NO

6. Did Nature's Classroom add to the students' experience at Muir Woods? If yes, in what way? If no, why not?

7. How helpful was the Nature Detective Guide for parent/adult-led groups? Was it a useful tool?

8. What did you like the most about the Nature's Classroom program?

9. What would you change about the Nature's Classroom program?

Please send the completed form to: Education Coordinator,
Muir Woods National Monument,
Mill Valley, CA 94965

Redwood Vocabulary

You may want to share these words with your class before your Muir Woods visit, or you may find them helpful during your exploration of Muir Woods.

Bark – the protective outer layer ("skin") of a tree or woody shrub. It covers the branches, trunk, and roots and assists in protecting the plant from disease, insects, and fire.

Burl – woody growth at the base of a redwood tree. It contains dormant redwood buds that sprout when the tree undergoes stress (fire, flood, human impact, etc.).

Canopy – layer formed by the leaves and branches of the forests' tallest trees. At Muir Woods the canopy is over 200 feet above the ground. It creates the cool and shady atmosphere in the woods.

Cone – woody reproductive part of cone bearing trees. It contains the seeds for the growth of young trees. Some cone bearing trees at Muir Woods: Douglas Fir, redwood.

Creek – flowing water, a small stream. A non-living element of a forest habitat. Redwood Creek flows from Mount Tamalpais to the Pacific Ocean.

Evergreen – a tree or plant whose leaves or needles stay green all year round. Examples: redwood, Douglas Fir, Evergreen Huckleberry.

Family Circle – the growth of redwood trees in a ring as a result of having sprouted from burls.

Habitat – the place where a person or other organism is most likely to be found; type of environment that an animal or plant normally lives or occurs. Some examples of habitats at Muir Woods: Redwood Creek is a habitat for Steelhead fingerlings; the redwood forest is a habitat for Spotted Owls.

Living elements – those that can take in food, get energy from it, grow, adapt to their surroundings, and reproduce their kind.

National Park/National Monument – a natural landmark, historic site, or tract of land set aside by a national government for preservation and public enjoyment.

Non-living elements – temperature, topography, climate, geology, and geography.

Old Growth – unlogged forest dominated by trees over 250 years old. Characteristics include: large trees, mixed forest age, mixed type of trees, snags, accumulations of decaying wood supporting plants and animals.

Preserve – to keep in unaltered condition, maintain unchanged.

Protect – to keep from being damaged or injured.

Provide – to furnish, supply, make available.

Recycle – to put through a cycle again, to reuse, to reprocess so as to use again.

Understory – the smaller shrubs and trees growing under the taller forest canopy.

Teacher's Reference List

We have many great resources available at the Visitor Center bookstore. You may find a book that you wish to share with your class before a Muir Woods visit, or a video to incorporate into your curriculum. **Teachers receive a 15% discount on all items purchased for educational use**, and mail order is available. Just call (415) 388-7368 and allow 2-3 weeks time for shipping.
* items available at the Muir Woods Visitor Center.

Muir Woods

* Frank, Susan and Frank, Phil, ***The Muir Woods Handbook***, ISBN: 0764910272
* Hart, John, ***Muir Woods: Redwood Refuge***, ISBN: 0962520640
* Khosla, Maya, ***Web of Water***, ISBN: 1883869277
* Morley, Jim, ***Muir Woods***, ISBN: 0938765531

Redwood Forests/Ancient Forests

* Anderson, Margaret, Field, Nancy, and Stephenson, Karen, ***Ancient Forests: Discovering Nature***, ISBN: 0941042146
* Adler, David A., ***Redwoods Are the Tallest Trees in the World***, ISBN: 069001368X
Collings, Randy, ***Redwood Empire***
Cooper, Ann, ***In the Forest***, ISBN: 0916278719
* Guiney, Miriam, ***Redwood Parks Activity Book***
Hewes, Jeremy Joan, ***Redwoods: World's Tallest Trees***, ISBN: 0831773812
* Reed-Jones, Carol, ***The Tree in the Ancient Forest*** ISBN: 1883220319
* Schneider, Bill, ***The Tree Giants: The Story of the Redwoods, The World's Largest Trees***, ISBN: 0937959405
* Vieira, Linda, ***The Ever-Living Tree: The Life and Times of a Coast Redwood***, ISBN: 0802774776

John Muir

* Cornell, Joseph, ***John Muir: My Life with Nature***, ISBN: 1584690097
* Greene, Carol, ***John Muir: Man of the Wild Places***, ISBN: 0516442201
* Muir, John, ***Stickeen***, ISBN: 1883220785
* Stetson, Lee, ed., ***The Wild Muir***, ISBN: 0939666758

Wildlife

Dunmire, Marj, ***Faces of the Forest***, ISBN: 0942559088
Guiberson, Branda Z., ***Salmon Story***, ISBN: 0805042547
The California Center for Wildlife, ***Living with Wildlife***, ISBN: 0871565471
National Wildlife Federation, ***Ranger Rick's Nature Scope***
Steelquist, Robert, ***Field Guide to Pacific Salmon***, ISBN: 0912365641

Native American

* Caduto, Michael J. and Bruchac, Joseph, ***Native Plant Stories***, ISBN: 1555912125
Caduto, Michael J. and Bruchac, Joseph, ***Keepers of the Animals***, ISBN: 1555913865
Caduto, Michael J. and Bruchac, Joseph, ***Keepers of the Earth***, ISBN: 1555913857
* Margolin, Malcolm, ***The Ohlone Way***, ISBN: 0930588010

Activity Books

Chichester, Page, ***The National Wildlife Federation Book of Family Nature Activities***, ISBN: 0805046860

* Cornell, Joseph, ***Sharing Nature With Children***, ISBN: 1883220734
Cornell, Joseph, ***Sharing Nature With Children II***, ISBN: 1883220874
* Ferra, Lorraine, ***A Crow Doesn't Need A Shadow: A Guide to Writing Poetry from Nature***, ISBN: 0879056002
Field, Nancy and Machlis, Sally, ***Discovering Endangered Species: A Nature Activity Book***, ISBN: 094104209X
* Field, Nancy and Machlis, Sally, ***Discovering Salmon: A Nature Activity Book***, ISBN: 0941042057

Natural History

* Kricher, John, ***Peterson's First Guide to Forests***, ISBN: 0395971977
Kricher, John, and Bennet, Sarah, ***Peterson Field Guide to Coloring Books – Forests***, ISBN: 0395346762
* Lyons, Kathleen, and Cooney-Lazaneo, Mary Beth, ***Plants of the Coast Redwood Region***, ISBN: 0962696102
* Mitchell, Andrew, ***The Young Naturalist: An Usborne Guide***, ISBN: 086020653X
* Ross, Michael Elsohn, ***Flower Watching with Alice Eastwood***, ISBN: 1575050056
* Watts, Phoebe, ***Redwood Region Flower Finder***, ISBN: 0912550082
* ***The Usborne Complete First Book of Nature***, ISBN: 0746005636

Audio

* Banana Slug String Band, "Adventure on the Air Cycle" audio tape
* Banana Slug String Band, "Dirt Made My Lunch" audio tape
Miche, Mary, "Earthy Tunes" audio tape. Song Trek Music, Berkeley.
Miche, Mary, "Nature Nuts" audio tape. Song Trek Music, Berkeley.

Video

* Cornell, Joseph, ***Sharing Nature with Children***, video, Dawn Publications.
* Frederic Back, ***The Man Who Planted Trees***, video, ISBN: 1559741112

Additional Resources

Association for Environmental and Outdoor Education (AEOE)
2120 N. Pacific Ave. #84, Santa Cruz, CA 95060 Phone: (831) 684-0148

Bay Area Environmental Education Fair (BAEER)
Takes place in San Rafael in the Marin County Civic Center.

Golden Gate National Parks Conservancy
www.parksconservancy.org

Humboldt Redwoods Interpretive Association
P.O. Box 276, Weott, CA 95571 Phone: (707) 946-2263

Muir Woods Web Site: http://www.nps.gov/muwo

National Park Service Web Site: www.nps.gov

Save-the-Redwoods League
114 Sansome Street, San Francisco, CA 94104 Phone: (415) 362-2352

Selected California State Science Standards

Grade 3:

Physical Sciences: Energy and matter have multiple forms and can be changed from one form to another. As a basis for understanding this concept:
- Students know energy comes from the Sun to Earth in the form of light.

Light has a source and travels in a direction. As a basis for understanding this concept:
- Students know sunlight can be blocked to create shadows.

Life Sciences: Adaptations in physical structure or behavior may improve an organism's chance for survival. As a basis for understanding this concept:
- Students know plants and animals have structures that serve different functions in growth, survival, and reproduction.
- Students know living things cause changes in the environment in which they live: some of these changes are detrimental to the organism or other organisms, and some are beneficial.
- Students know that when the environment changes, some plants and animals survive and reproduce; others die or move to new locations.

Grade 4:

Life Sciences: All organisms need energy and matter to live and grow. As a basis for understanding this concept:
- Students know producers and consumers (herbivores, carnivores, omnivores, and decomposers) are related in food chains and food webs and may compete with each other for resources in an ecosystem.
- Students know decomposers, including many fungi, insects, and microorganisms, recycle matter from dead plants and animals.

Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:
- Students know ecosystems can be characterized by their living and nonliving components.
- Students know that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

Grade 5:

Life Sciences: Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. As a basis for understanding this concept:
- Students know plants use carbon dioxide (CO_2) and energy from sunlight to build molecules of sugar and release oxygen.

Earth Sciences: Water on Earth moves between the oceans and land through the processes of evaporation and condensation. As a basis for understanding this concept:
- Students know water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, sleet, or snow.